Testbeds and Technologies for Potential Mars Orbital Sample Capture and Manipulation

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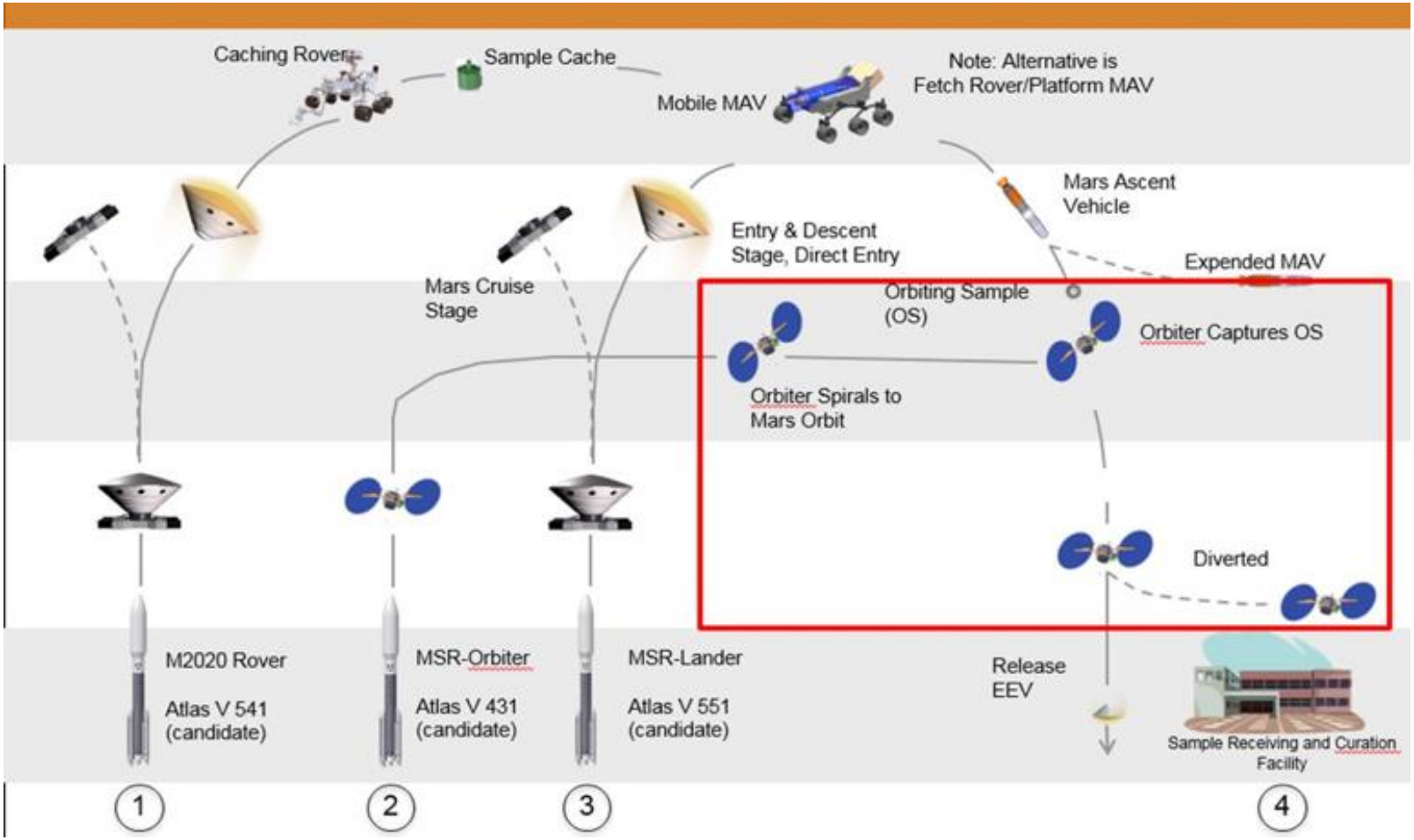
Notional Mars Sample Return Architecture



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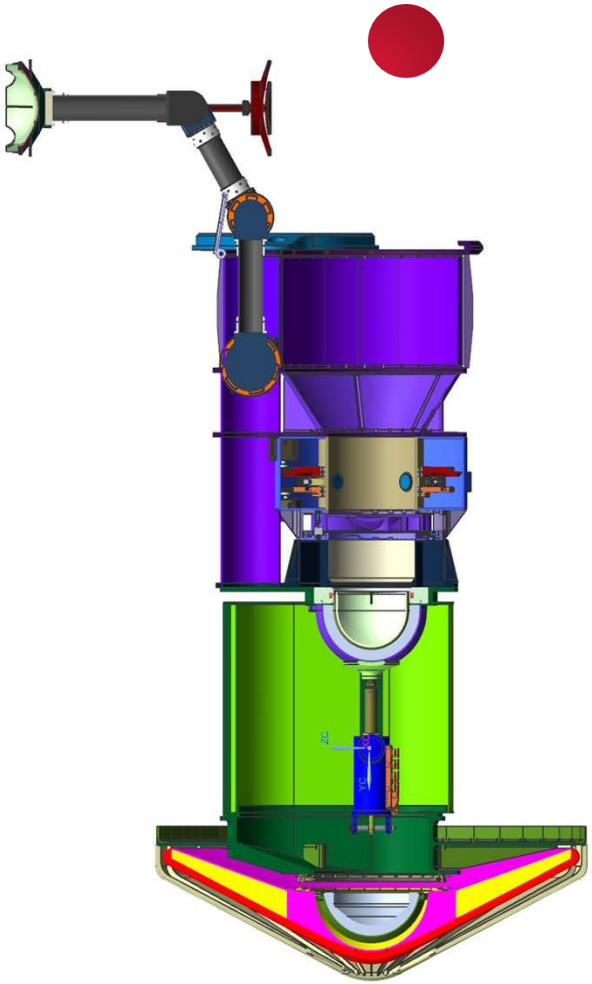
Rendezvous Orientation & Capture System



Track orbiting OS

Capture OS

Constrain OS

Reorient OS

Load into Primary Containment Vessel (PCV)

Load PCV into Secondary Containment Vessel (SCV) in Earth Return Module

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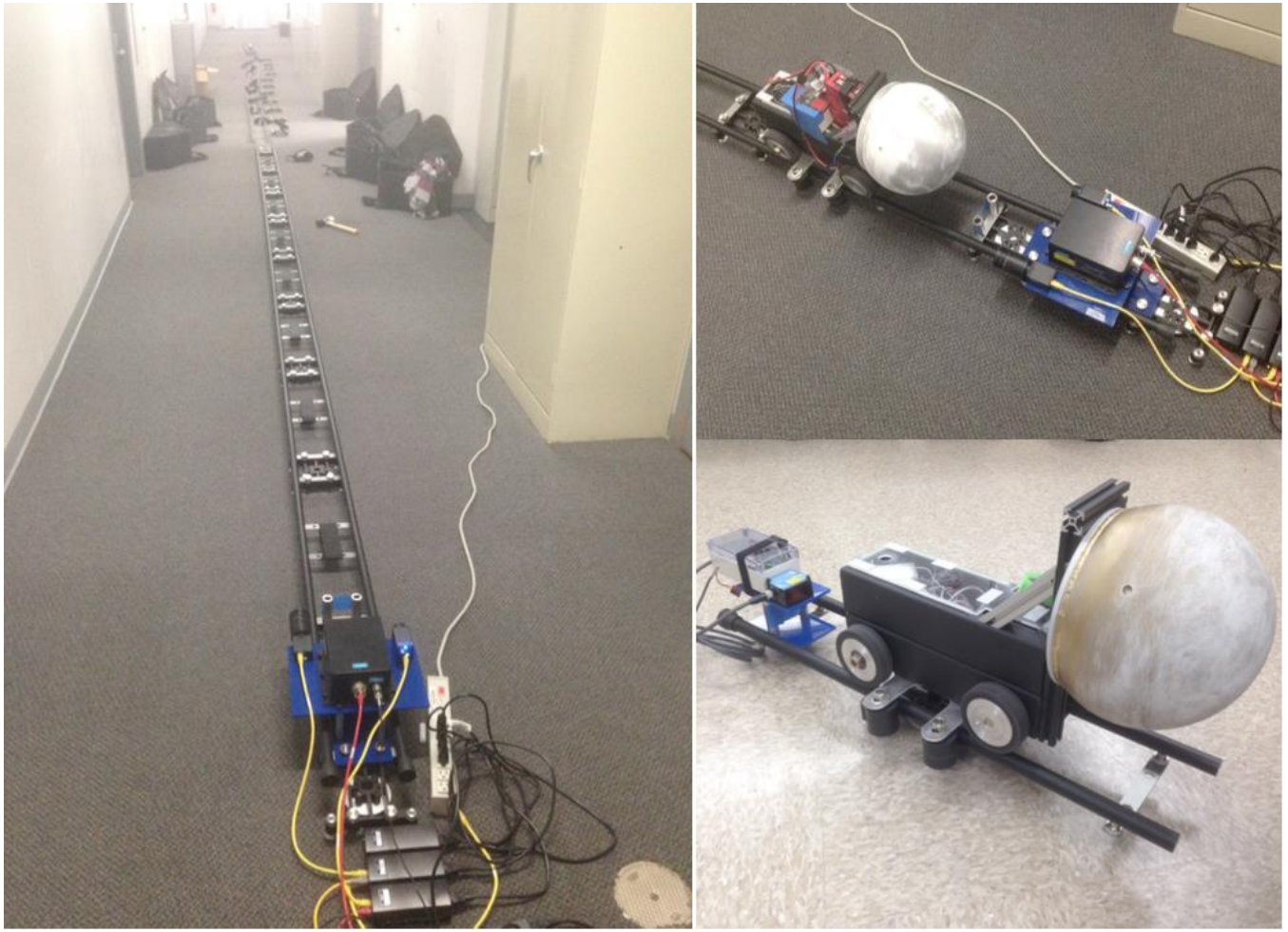
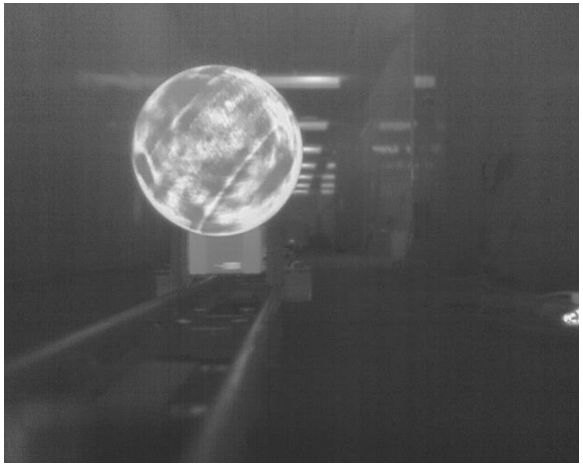
Overview of Testbeds

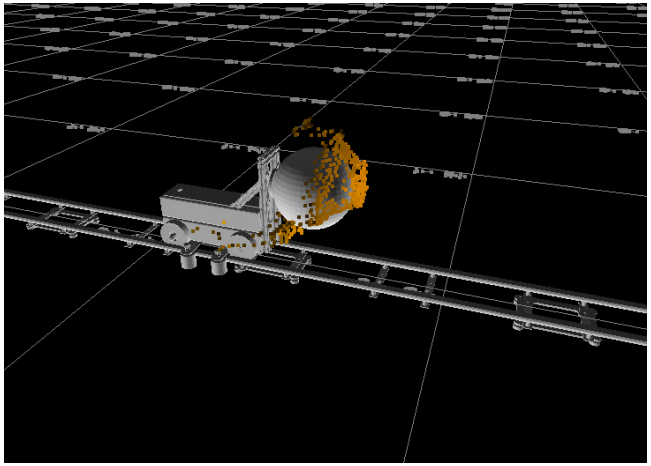
- Standalone linear testbed for tracking OS
- End-to-end testbed for ConOps 1 (Chimney Sweep)
- End-to-end testbed for ConOps 2 (MACARONE)

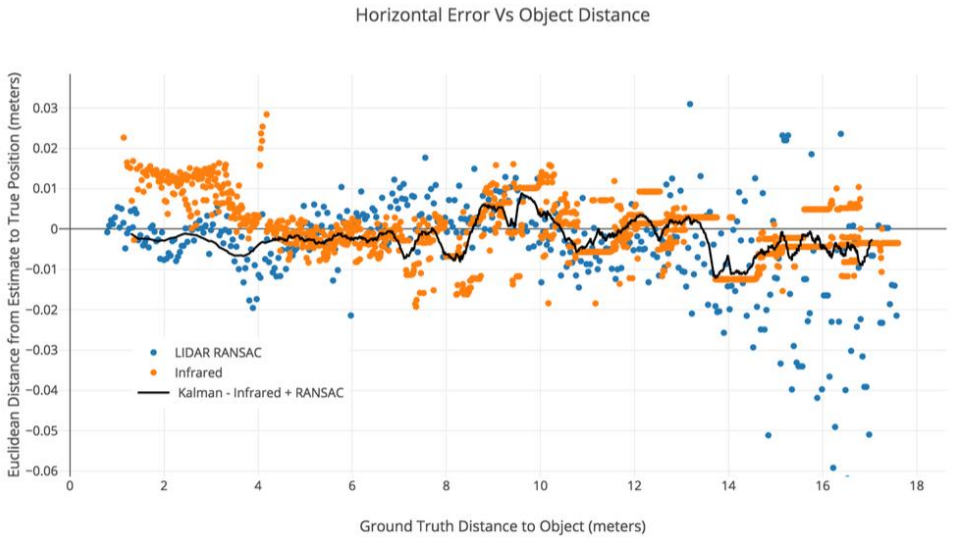
Testbed 1: Linear Stage

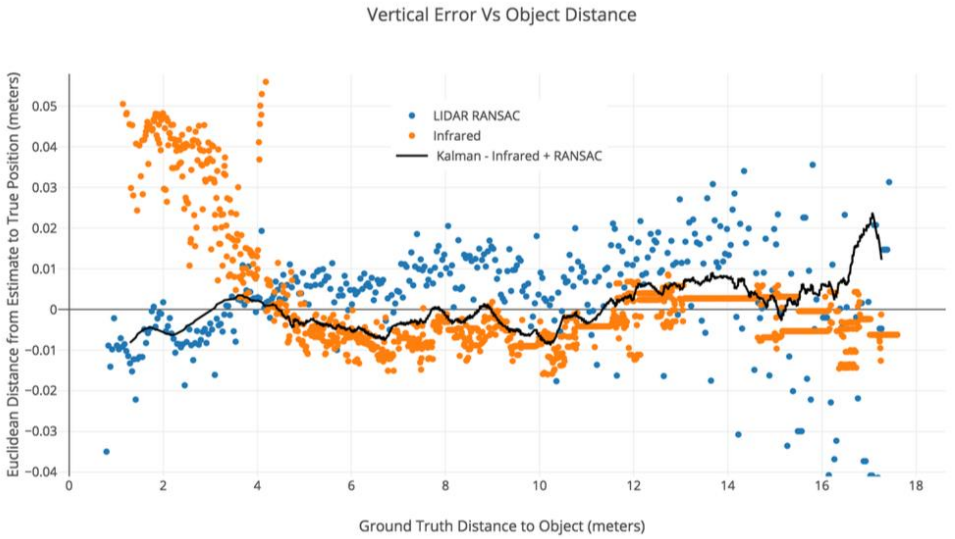


Linear Stage Results

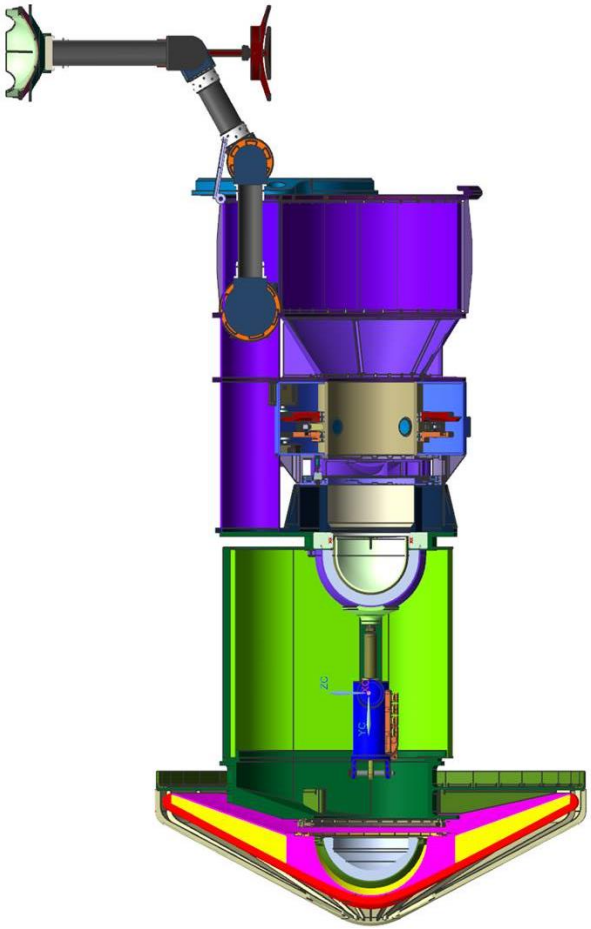








Testbed 2: Chimney Sweep



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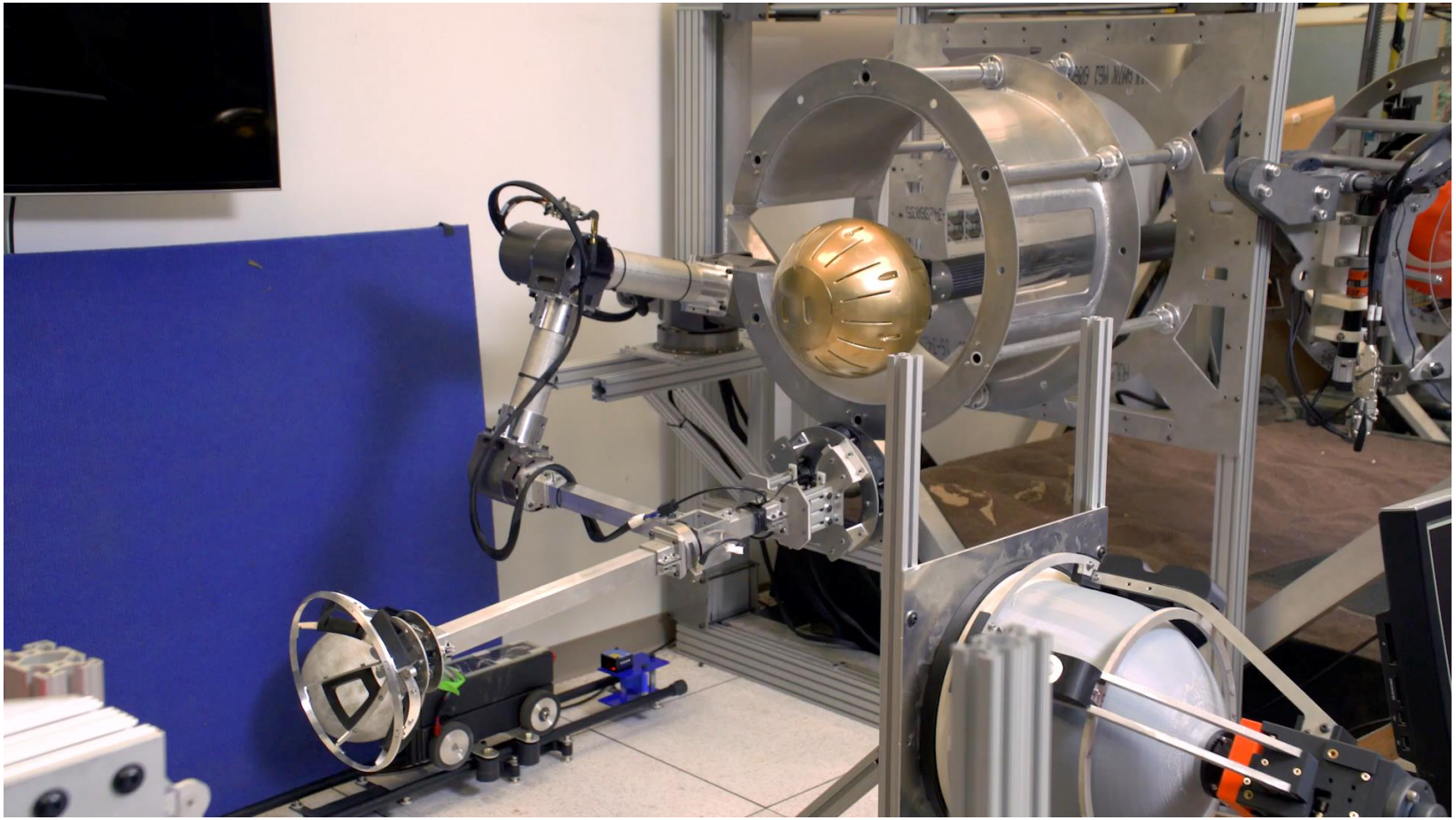
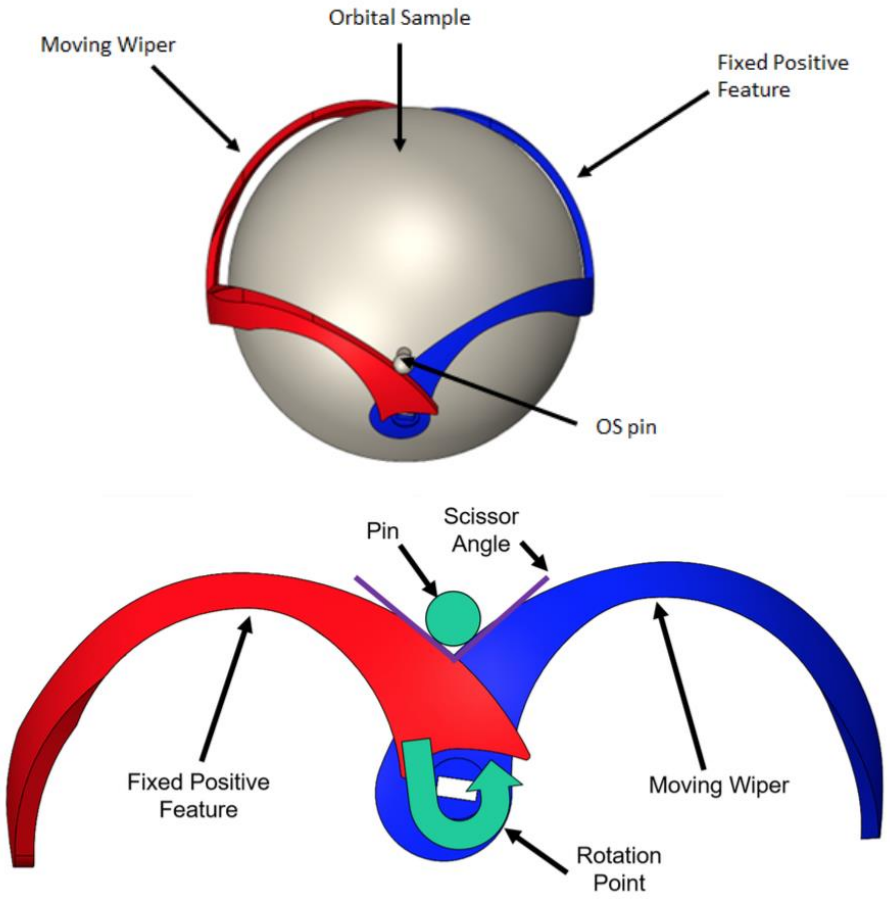
Capture & Constrain: Chimney Sweep



Reorientation Concept 1: Wiper



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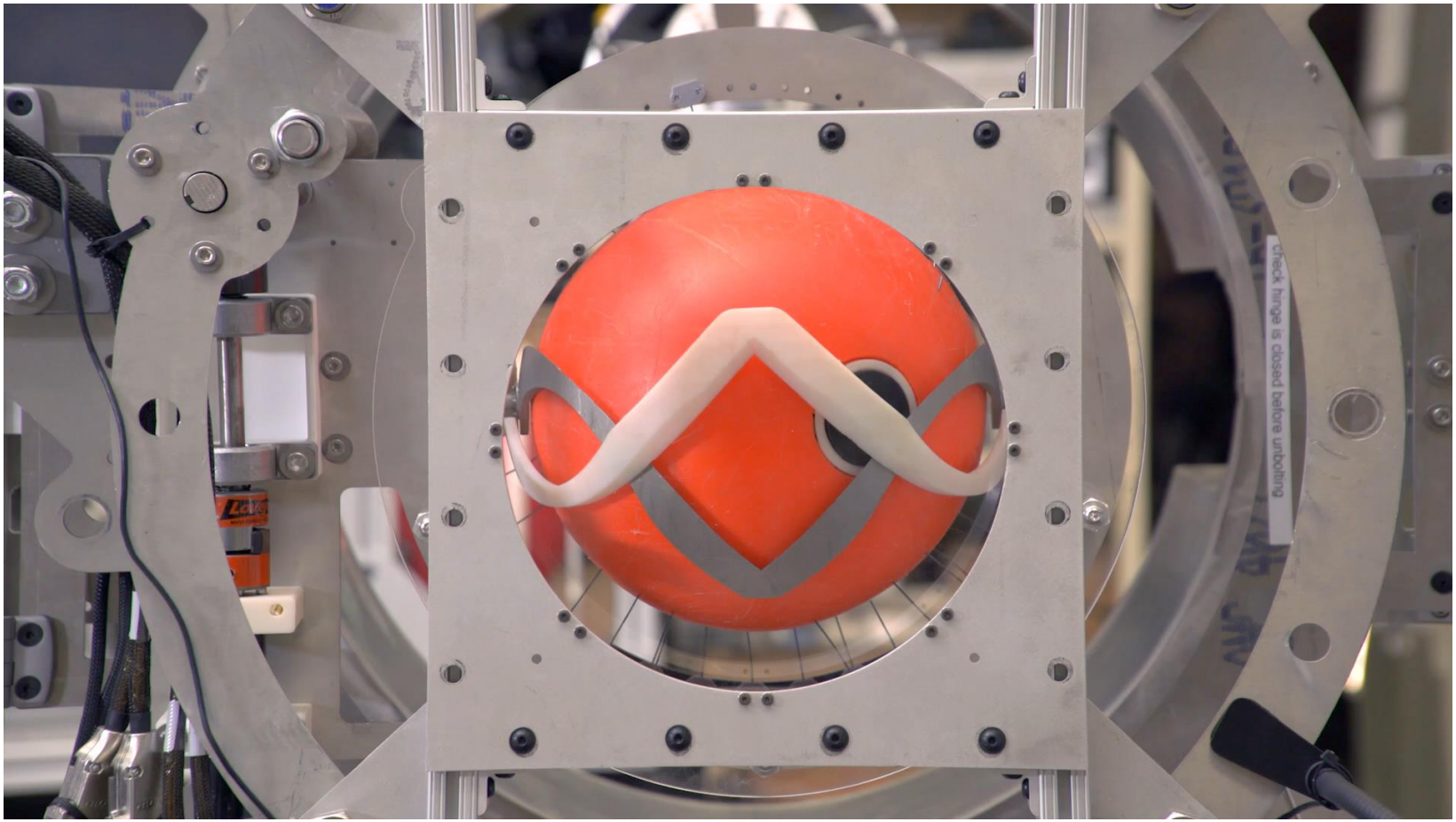
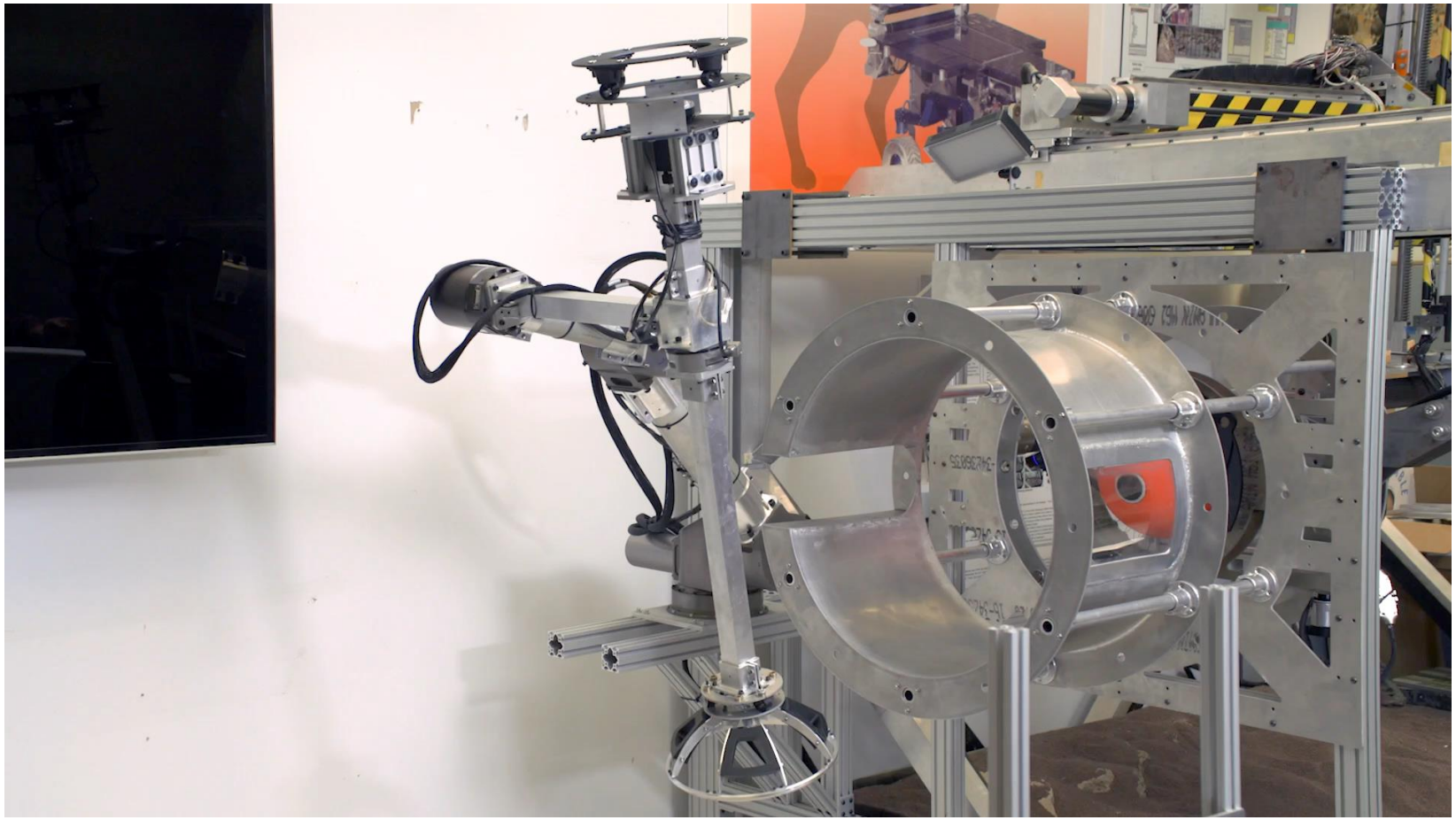
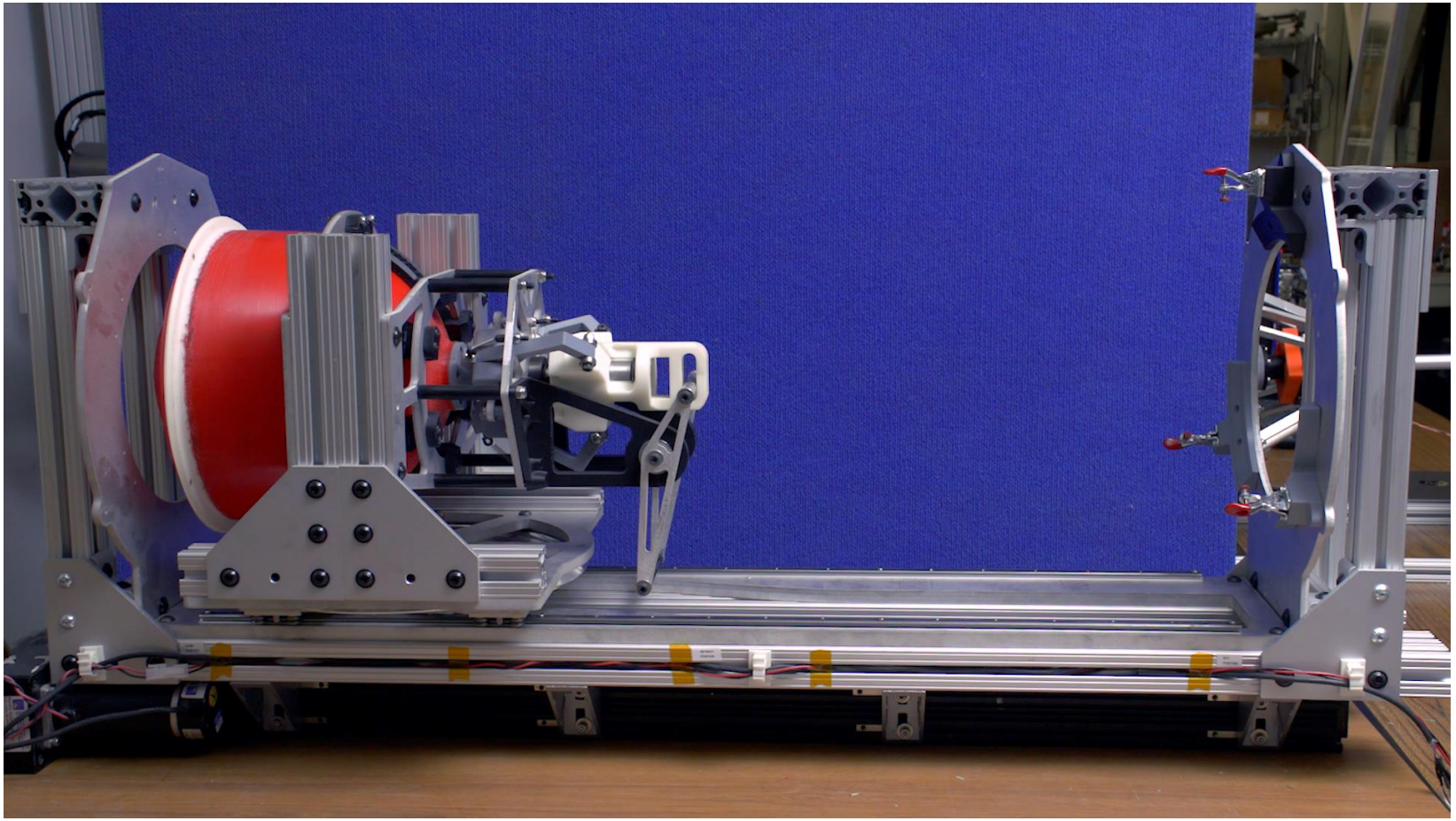
Reorientation: Chimney Sweep



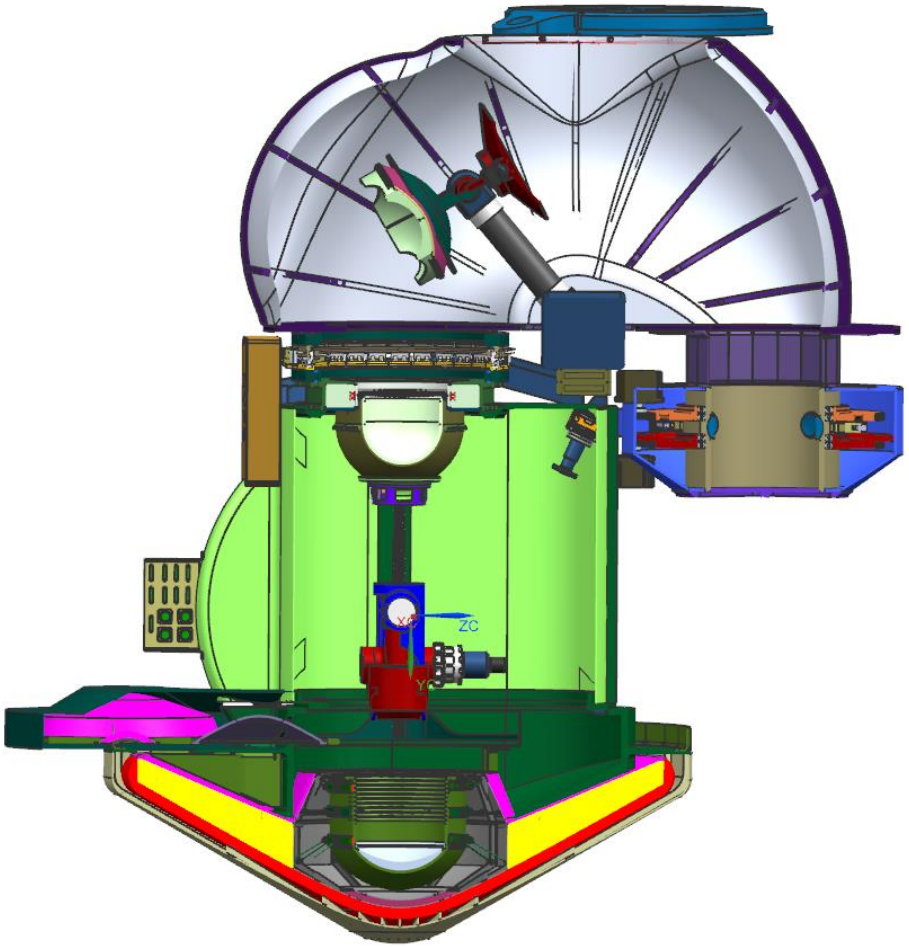
Transfer Oriented OS to PCV: Chimney Sweep



Load PCV into SCV: Chimney Sweep



Testbed 3: MACARONE



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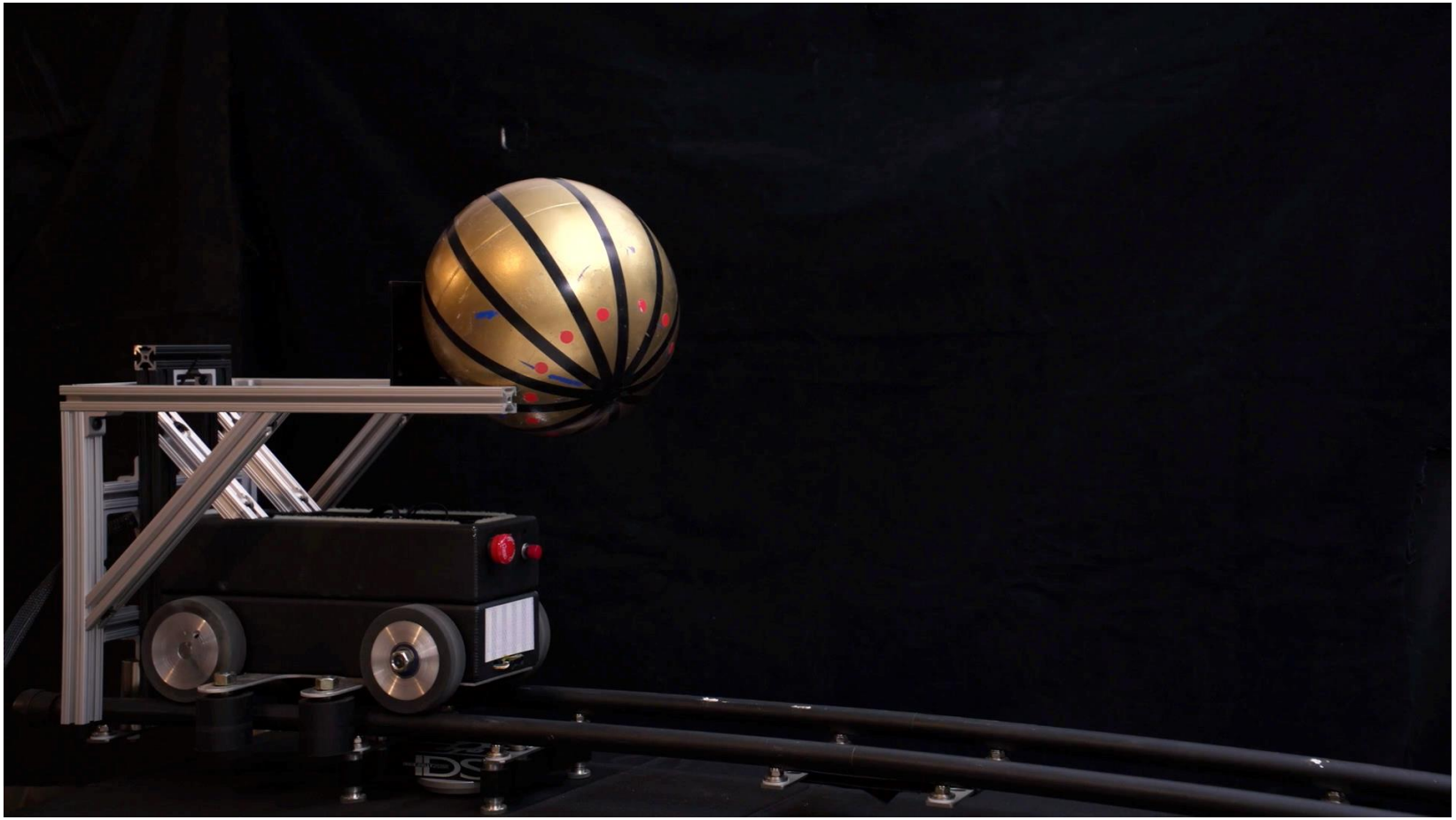
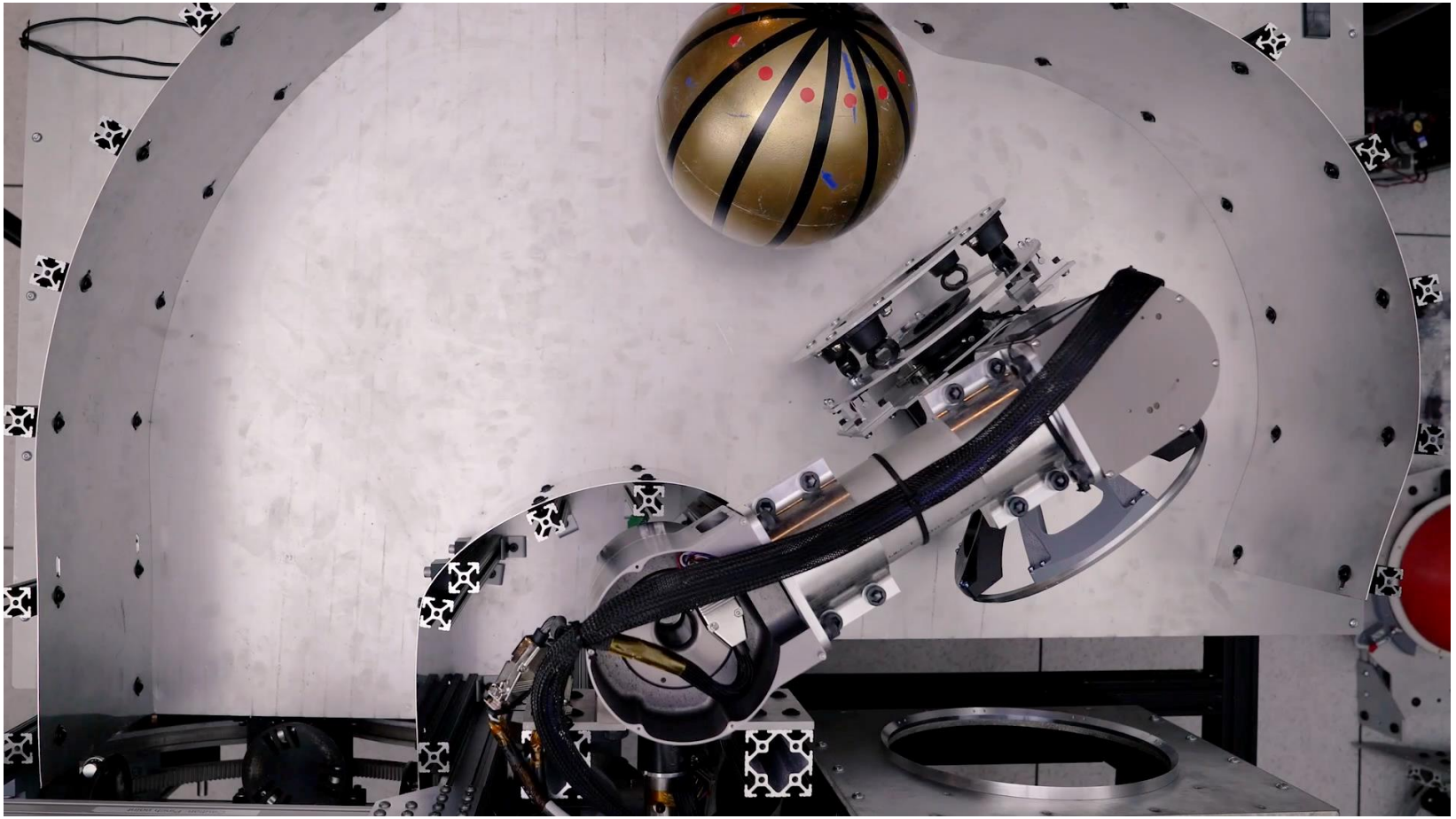
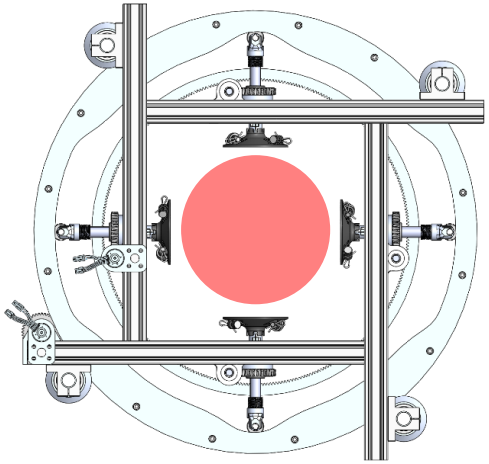
Capture: MACARONE

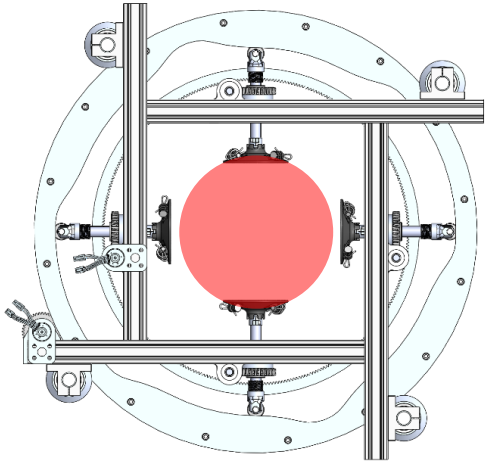


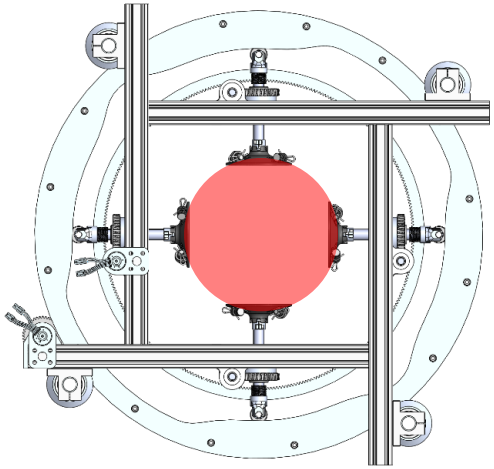
Constrain: MACARONE

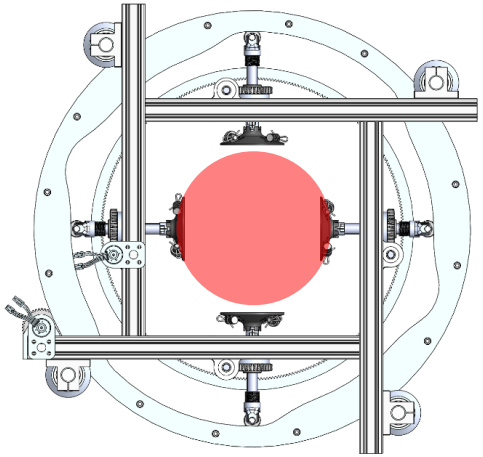


Reorientation Concept 2: Rubik's Cube Solver









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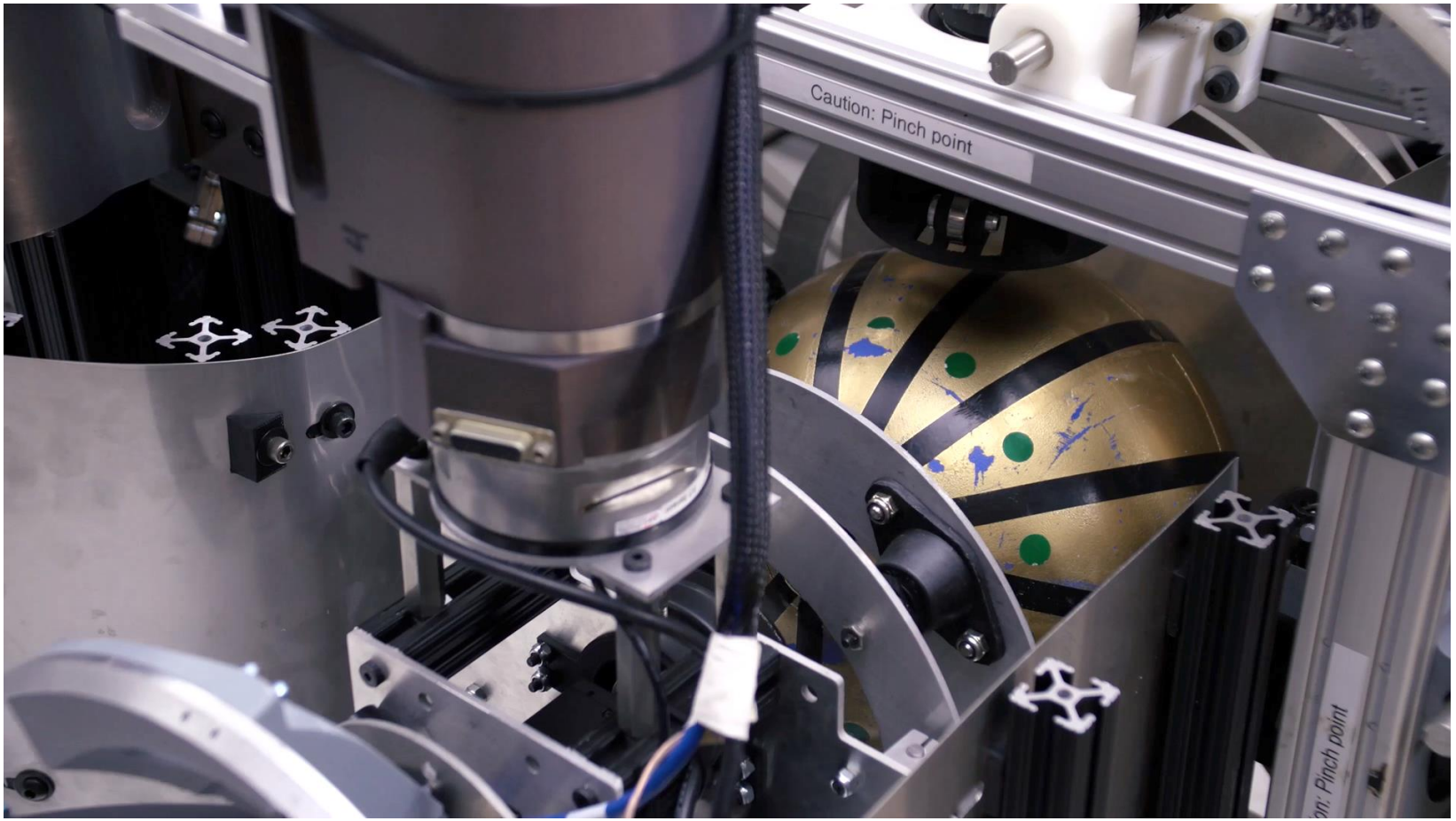
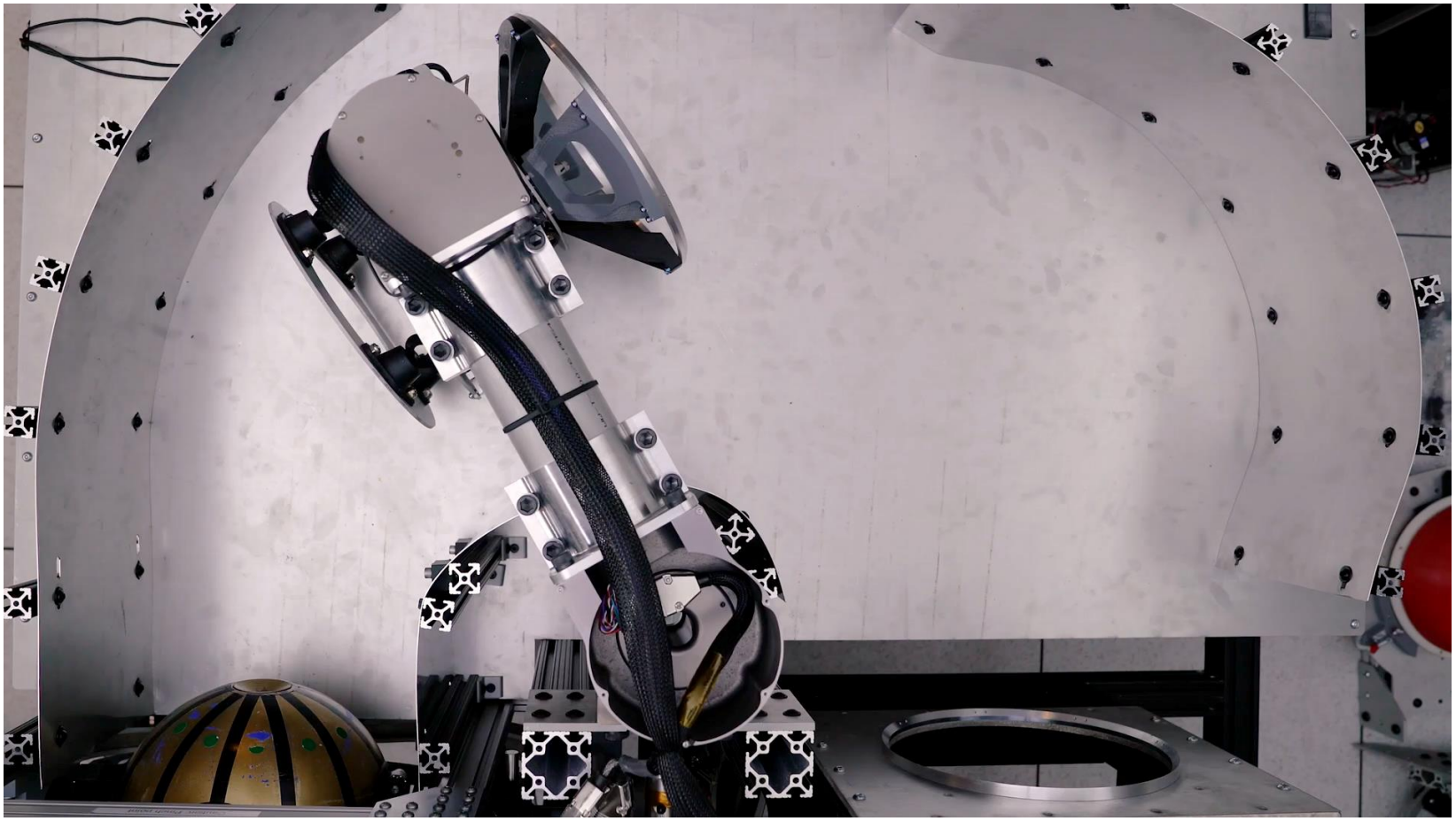
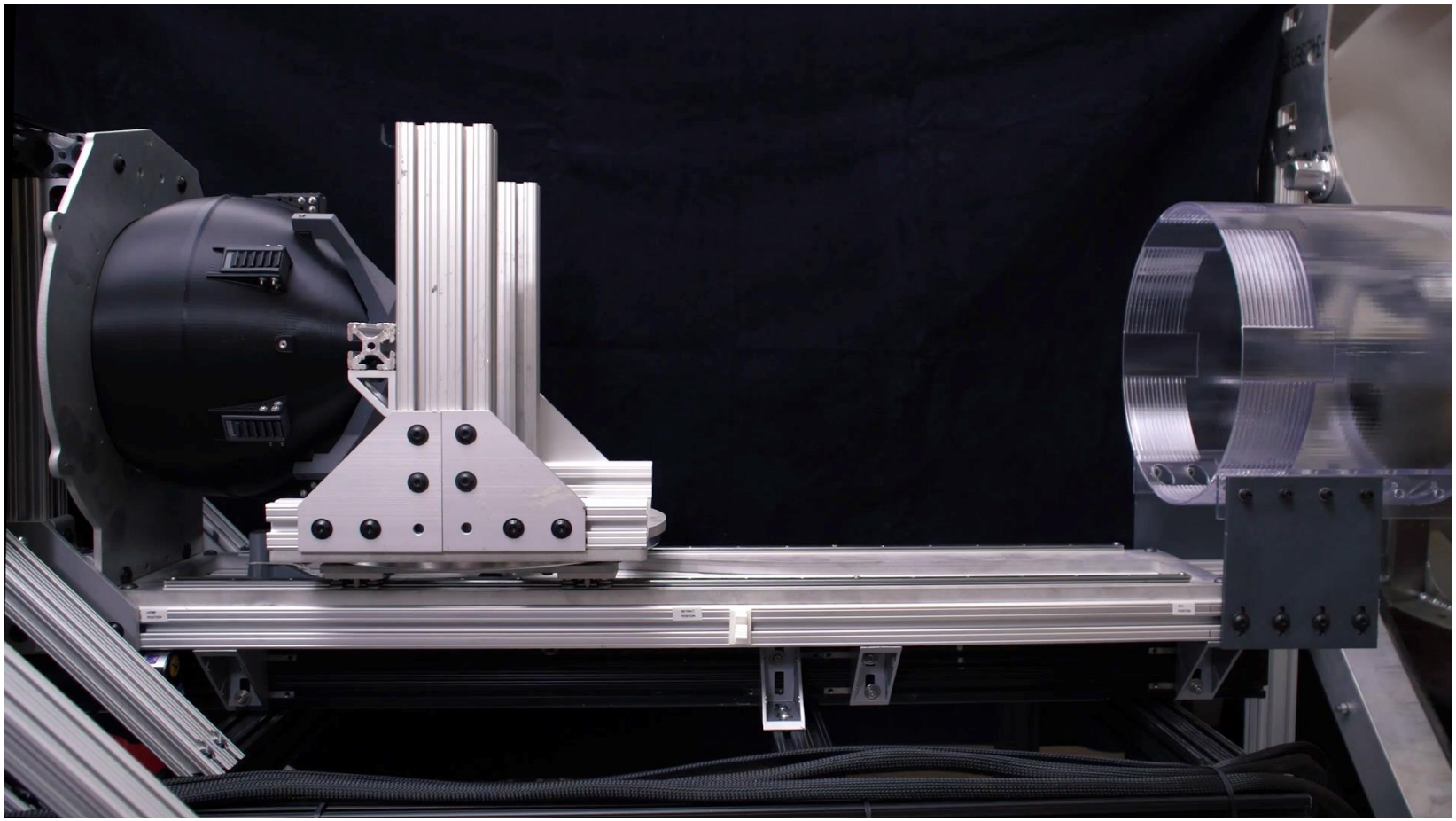
Reorientation: MACARONE



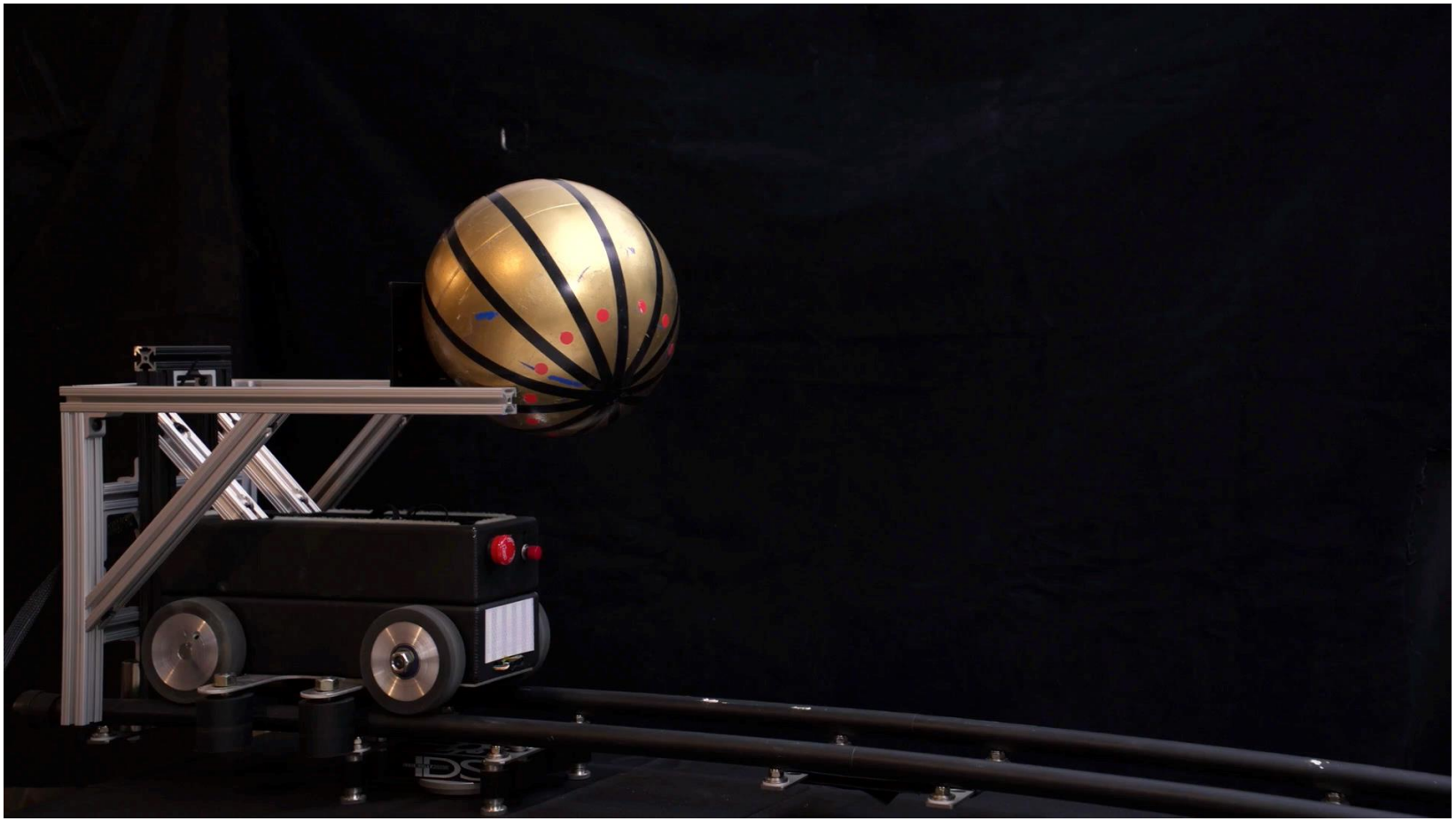
Transfer Oriented OS to PCV: MACARONE



Load PCV into SCV: MACARONE



End-to-end Testbed: MACARONE



Acknowledgements

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